PATENT CLAIMS

1. A laser beam directing system (1), comprising:

a first deflection mirror (23) which is connected with an elevation axis of the laser beam directing system (1);

a primary laser (13) which is coupleable into telescope optics (12) by a first deflection mirror (23);

a first auxiliary laser (19) that is oriented in parallel to an azimuth rotation axis of the laser beam directing system (1), wherein the first deflection mirror (23) has a dielectric coating, the dielectric coating being configured so that the first deflection mirror (23) is reflective for the primary laser (13) and partially reflecting for the auxiliary lasers (19, 21);

a second auxiliary laser (21) that is oriented parallel to an elevation rotation axis of the laser beam directing system (1); and

a coplanar plate (37), the coplanar plate (37) being spatially fixated in the elevation axis and the second auxiliary laser (21) being oriented orthogonal to the coplanar plate (37), the first deflection mirror (23) being arranged between the second auxiliary laser (21) and the coplanar plate (37); a first detector (15),

wherein the first auxiliary laser (19), the second auxiliary laser (21) and the first detector (15) are arranged and oriented in the laser beam directing system (1) so that the first deflection mirror (23) is alignable by comparing the beams of the first auxiliary laser (19) and the second auxiliary laser (21) impacting the first detector (15) so that a primary laser beam (13) is coupleable into the telescope optics (12) parallel to the elevation rotation axis

a control unit (45),

wherein the control unit (45) is configured to determine a first angle of incidence of the first auxiliary laser beam (19) and a second angle of incidence of the second auxiliary laser beam (21) on the first detector (15), and

wherein the control unit (45) is configured to adjust the first deflection mirror (23) so that the first angle of incidence is identical to the second angle of incidence.

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~~2. The laser beam directing system (1) according to claim 1,~~

~~wherein the first deflection mirror (23) has a dielectric coating, and~~

~~wherein the dielectric coating is configured so that the first deflection mirror (23) is reflective for the primary laser (13) and partially reflecting for the auxiliary lasers (19, 21).~~

2.~~3.~~ The laser beam directing system (1) according to ~~one of the claims 1 and 2~~ claim 1,

wherein the primary laser (13) has a first wavelength,

wherein the first auxiliary laser (19) has a second wavelength,

wherein the second auxiliary laser (21) has a third wavelength, and

wherein the first wavelength differs from the second wavelength and from the third wavelength.

3.~~4.~~ The laser beam directing system (1) according to one of the claims 1 ~~through 3~~ or 2,

wherein an adjustment element (43) is provided at the first deflection mirror (23), and

wherein the adjustment element (43) is configured to adjust an inclination angle or an orientation of the first deflection mirror (23) in the azimuth rotation axis and in the elevation rotation axis.

4.~~5.~~ The laser beam directing system according to ~~claim 4~~ claim 3, wherein the adjustment element (43) is configured as a piezomotor.

5.~~6.~~ The laser beam directing system according to one of the claims 1 through ~~5~~ 4,

wherein the first auxiliary laser (19) is operable simultaneously or time sequentially with the second auxiliary laser (21).

~~7. The laser beam directing system (1) according to one of the claims 1 through 6, further comprising:~~

~~a control unit (45),~~

~~wherein the control unit (45) is configured to determine a first angle of incidence of the first auxiliary laser beam (19) and a second angle of incidence of the second auxiliary laser beam (21) on the first detector (15), and~~

~~wherein the control unit (45) is configured to adjust the first deflection mirror (23) so that the first angle of incidence is identical to the second angle of incidence.~~

6.~~8.~~ The laser beam directing system according to one of the claims 1 through ~~7~~ 5, further comprising:

a first beam splitter component (31),

wherein the first beam splitter component (31) is configured to decouple a first portion of the first auxiliary laser beam (19) at a right angle onto the first detector (15) and to let a second portion of the first auxiliary laser beam pass through, and

wherein the first beam splitter component (31) is configured to decouple a first portion of the second auxiliary laser beam (21) at a right angle onto the first detector (15).

7.~~9.~~ The laser beam directing system (1) according to claim ~~8~~ 6, further comprising:

a first coplanar plate (35) which is arranged physically fixated in the azimuth rotation axis of the laser beam directing system (1),

wherein the first coplanar plate (35) is configured partially reflecting for the first auxiliary laser (19) and for the second auxiliary laser (21), and

wherein an orientation of the first auxiliary laser (19) parallel to the azimuth rotation axis of the laser beam directing system (1) is adjustable by the first coplanar plate (35), the first beam splitter component (31) and the first detector (15).

8.~~10~~. The laser beam directing system according to claim ~~9~~ 7, further comprising:

a first aperture (39),

wherein the first aperture (39) is configured to close the first coplanar plate (35).

9.~~11~~. The laser beam directing system according to one of the claims 1 through ~~10~~ 8 further comprising:

a second detector (17),

wherein the second detector (17) is arranged in the laser beam directing system (1) so that the first deflection mirror (23) is alignable by comparing the beams

of the first auxiliary laser (19) and the second auxiliary laser (21) impacting the second detector (17) so that a primary laser beam (13) is coupleable into the telescope optics (12) parallel to the elevation rotation axis.

10.~~12.~~ The laser beam directing system (1) according to one of the claims 1 through ~~11~~ 9, further comprising:

a second deflection mirror (25) , a third deflection mirror (27) and a fourth deflection mirror (29),

wherein the second deflection mirror (25), the third deflection mirror (27) and the fourth deflection mirror (29) are mounted at an azimuth rotation yoke (3) of the laser beam directing system (1), and

wherein the first auxiliary laser(19), the second auxiliary laser (21) and the first detector (15) are arranged in the laser beam directing system (1) so that the second deflection mirror (25), the third deflection mirror (27) and the fourth deflection mirror (29) are alignable by comparing the beams of the first auxiliary laser (19) and the second auxiliary laser (21) impacting the first detector (15) so that a primary laser beam (13) extends parallel to the azimuth rotation axis and parallel to the elevation rotation axis in the laser beam directing system (1).

11.~~13.~~ A method for orienting optical components (23, 25, 27, 29) of a laser beam directing system (1) according to one of the claims 1 through ~~12~~ 10, comprising the steps of:

operating (S05) a first auxiliary laser (19) which is aligned in parallel with an azimuth rotation axis of the laser beam directing system (1) such that a first auxiliary laser beam of the first auxiliary laser (19) impacts a first detector (15);

operating (S07) a second auxiliary laser (21) which is aligned parallel to an elevation rotation axis of the laser beam directing system (1) such that a second auxiliary laser beam of the second auxiliary laser (21) passes through the first deflection mirror (23), is reflected by a coplanar plate (37) and by the first deflection mirror (23) and impacts the first detector (15);

determining (S09) a first angle of incidence of the first auxiliary laser beam (19) on ~~a~~ the first detector (15);

determining (S11) a second angle of incidence of the second auxiliary laser beam ~~(21)~~ on the first detector (15); and

adjusting (S13) the ~~optical components (23, 25, 27, 29)~~ first deflection mirror (23) of the laser beam directing system (1) so that the first angle of incidence is identical with the second angle of incidence.

12.~~14.~~ The method according to claim ~~13~~ 11, wherein adjusting or readjusting ~~the optical components (23, 25, 27, 29)~~ the first deflection mirror (23) is performed dynamically.

13.~~15.~~ The method according to one of the claims ~~13 and 14~~ 11 and 12, further comprising the steps of:

aligning (S01) the first auxiliary laser (19) parallel to the azimuth rotation axis of the laser beam directing system (1); and

aligning (S03) the second auxiliary laser (21) parallel to the elevation rotation axis of the laser beam directing system (1).